Science and Technology Education Program

The Science and Technology Education Program (STEP) at Lawrence Livermore National Laboratory serves as a resource to students, teachers, and faculty by facilitating research interactions with Livermore's world-class scientific facilities and staff. For example, STEP helps place college students in research internships that support the Laboratory's national-security mission. In addition, STEP programs contribute to the quality of science teaching in California and help to meet the science-educational needs of the local and regional communities surrounding the Laboratory by supporting science outreach to K–12 students, providing professional development for K–14 science educators, and establishing partnerships with K–14 academic institutions. STEP also partners with the Edward Teller Education Center to provide professional-development programs for California science educators, with an initial emphasis in the San Joaquin and Livermore valleys.

Critical Skills Internship Program

STEP's Critical Skills Internship Program (CSIP) (http://internships.llnl.gov) helps match college students with research internships within the Laboratory's Stockpile Stewardship Program (SSP). Most of these internships are funded directly by the National Nuclear Security Administration (NNSA)/Defense Programs/Office of University Partnerships through its Laboratory Critical-Skills Development Program.

By targeting college students with "critical skills" in four major disciplines (chemistry and materials science, computer science, engineering, and physics), the CSIP internships address critical-skills recruiting neds throughout Livermore's SSP. The CSIP internships serve an integral part of the Laboratory's overall recruiting strategy by helping to create an external pipeline of college students who have had direct contact with NNSA mission-based science through their on-site research experiences. In fact, of the 236 students who participated in CSIP internships from fiscal years 2000 to 2002, 27 were hired as Laboratory employees during the same period, a hiring rate of 10 to 15 percent per fiscal year.

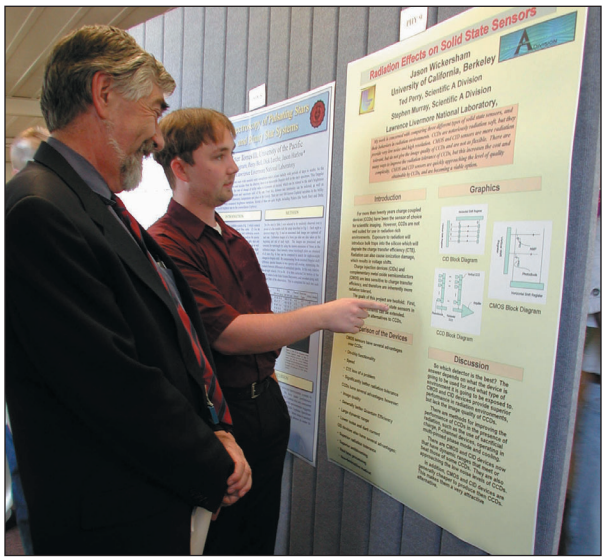
CSIP students can attend lectures, seminars, and tours that inform them about SSP research at the Laboratory and that help them develop their research and career goals. The interns are required to create posters documenting their research for the Laboratory's Student Research Symposium. They are also encouraged to describe their research experiences in Web-based portfolios, which both highlight their work for possible employment and serve as CSIP recruiting tools for future students.

STEP also works with Livermore's National Security Office to contribute to common mission goals between the Department of Defense and the Department of Energy by providing internship opportunities for college students in the Reserve Officer Training Corps (ROTC) and U.S. military academy cadets and midshipmen. Both the Military Academic Research Associates program and the ROTC internships help to ensure that military personnel in training have the same access to the Laboratory's scientific facilities and staff as civilian personnel in training.

Community College Faculty

STEP has established a partnership between the University of California (UC), Merced; Merced College; and the Laboratory to support and promote student achievement in science and math in the Central Valley. As part of this partnership, the Laboratory sponsors an Educator Day for educators and state legislative representatives from throughout the San Joaquin Valley. Participants attend presentations highlighting Livermore resources that are available to support science instructions. Participants also visit research laboratories to experience the "real science" from which these education resources are developed.

In addition, STEP has helped facilitate faculty research experiences at the Laboratory. For example, faculty members from Merced College and Modesto College have participated in Laboratory research in biotechnology,



Hal Graboske, acting Deputy Director for Science and Technology, chats with a UC Berkeley student at the 2002 Student Research Symposium.

in geographic information systems, and at the Center for Accelerator Mass Spectrometry. These internships expose faculty members to Laboratory innovations in technology and procedures, enabling faculty members to renew their science content knowledge, update their science curriculum, and implement certificate programs in areas such as biotechnology and geographic information systems.

STEP has also established a scientific-equipment loan program with Merced College. The equipment will be used to develop programs to train community college students in optics, biotechnology, environmental science, and computer science technology.

K–12 Students and Teachers

STEP leads the Laboratory's science-education activities by promoting science outreach to K–12 students and teachers. To encourage student interest in science, math, and engineering, STEP cosponsors student conferences, such as Expanding Your Horizons and Exploring Your Future; after-school activities, such as Future Scientists and Engineers of America and the Laboratory's Science and Technology Explorer Post; and science and math competitions, such as Math Challenge and the Tri-Valley Science and Engineering Fair. During fiscal year 2002, STEP's science-outreach and educator projects engaged approximately 13,000 students and 1,000 teachers.

Students work with a Laboratory scientist during a hands-on science demonstration.

In addition, STEP has helped to establish the Promoting Achievement Through Hands-On Science (PATHS) program, a partnership between the Laboratory, UC Merced, and the San Joaquin County Office of Education. PATHS brings the Laboratory's Fun With Science (FWS) program to schools in the Livermore area and in the Central Valley. During FWS presentations, students are encouraged to interact with Laboratory scientists as they conduct hands-on science demonstrations. These demonstrations help students to become engaged, excited, and involved in science-education activities. Following each FWS school presentation, teachers are trained to teach a school-selected, hands-on, inquiry-based science unit from the Lawrence Hall of Science. FWS demonstrations are also offered at community events.

STEP also coordinates the Laboratory's Science on Saturday (SOS) program, which provides free science lectures and demonstrations for students in grades 6–12, as well as their teachers and parents. SOS topics represent the forefront of Livermore's science and technology research in a variety of disciplines. After each lecture, Laboratory scientists meet with teachers to answer questions and provide additional scientific background information. Educators can also be trained to teach science curriculum units that correspond to the SOS lectures.

Edward Teller Education Center

The Edward Teller Education Center (ETEC) (http://etec.ucdavis.edu) is a University of California collaborative that was established to provide professional-development instruction in science and technology to K–14 teachers. Initially funded by the UC Office of the President, ETEC is operated by UC Davis, UC Merced, and Lawrence Livermore. The ETEC facility is located adjacent to the Laboratory at the Livermore campus of the UC Davis Department of Applied Science. ETEC programs are offered at the ETEC facility, at the campuses of member institutions, and at Laboratory facilities.

In collaboration with STEP, ETEC has offered a variety of professional-development programs in science and technology for teachers. For example, ETEC and STEP have partnered to offer Computer Technology Workshops, which help educators to more effectively use computers, the Web, and multimedia tools as teaching resources. ETEC and STEP also cohost the Edward Teller Science and Technology Education Symposium, which serves as a bridge between the science classroom and the research laboratory by providing science educators from secondary schools and community colleges with the opportunity to explore ongoing Laboratory research in physics, chemistry, biology, environmental science, and radiation science.

The Future

The Laboratory's continuing commitment to education has roots in the close relationship between the Laboratory and the UC system and in the realizations that (1) Livermore's leading-edge research requires the development of specific critical skills not readily available from universities and (2) the Laboratory can be a contributing partner in helping to solve the many challenges facing K–14 science education. STEP is looking forward to continuing its role as a contributor to the critical-skills recruitment efforts of NNSA programs and to partnering with California's K–14 education community.

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